

### REMARKS

This is in response to the Office Action mailed on July 1, 2010. Claims 1-21 were pending in the application, and the Examiner rejected all claims. With this amendment, claims 1 and 6 are amended, claims 22-24 are added, and the remaining claims are unchanged in the application.

On page 2 of the Office Action, the Examiner rejected claims 1 and 6 under 35 U.S.C. §112, first paragraph, as purportedly failing to comply with the written description requirement. Specifically, the Examiner objected to the language “controlling the cell current by automation” in claims 1 and 6. Independent claim 1 has been amended to read “automatically controlling the cell current to obtain a controlled electric field in the cell...” and independent claim 6 has been amended to read “a control device controlling a cell current...”. Support for these amendments are found at page 8, lines 9-15 (of WO 03/062152). Further support is found at page 10, lines 2-12 and 16-25; page 12, lines 23-25; and page 14, lines 14-16. Applicant thus submits that the claims are in proper form.

On page 3 of the Office Action, the Examiner rejected claims 1, 3-8, and 10-21 under 35 U.S.C. §103(a) as being unpatentable over Herbst et al. (US Patent No. 4,872,959) in view of Haivala (US Patent No. 5,022,974). Applicant respectfully traverses the Examiner’s rejection. Of the rejected claims, claims 1 and 6 are independent claims.

Independent claim 1 is drawn to a method for removing impurities from waste water by electroflotation. Independent claim 1 specifically claims an electrolysis space that is defined by coaxial pipes that act as electrodes. The electrolysis space is an uninterrupted, generally cylindrical space through which the hydrogen gas produced in the cells raises the flock along a generally linear path. Claim 1 also specifically includes feeding flush water intermittently through the inner electrode pipe to produce flush water sprays through the holes against the inner surface of the outer electrode pipe. This is simply neither taught nor suggested by either of the references cited by the Examiner.

Herbst et al. teaches a fundamentally different type of system. The liquid to be treated is introduced into a treatment chamber where it follows a helical path defined by separators (or insulators) 15 and 19. The helical path is substantially in a horizontal direction from inlet portion 11, through the treatment chamber, to the outlet that leads to filtering or settling tank 38. Herbst completely fails to teach or suggest two concentrically or coaxially arranged pipes, used as electrodes, and defining an uninterrupted generally cylindrical electrolysis space through which hydrogen gas raises the flock in a separation tower. This is simply not found. The paths through which the liquid travels in Herbst et al. is definitively helical, and not linear. In addition, hydrogen gas does not “raise flock” through an uninterrupted cylindrical electrolysis space in a generally linear path. Instead, the electrolysis space is interrupted by insulators 15 and 19 so that it is not generally cylindrical, but is instead helical.

This deficiency is not cured by Haivala. In fact, Haivala does not even teach coaxial pipes used as electrodes. Instead, Haivala teaches two plates 1 and 2 which are connected by a transverse plate 9. Therefore, Haivala cannot teach an uninterrupted generally cylindrical electrolysis space.

Similarly, Haivala does not teach or suggest, anywhere, that hydrogen raises a flock in a generally cylindrical space along a generally linear path. To the contrary, Haivala specifically states “the waste water is introduced to the waste apparatus through an inlet conduit 11 and it passes horizontally in the axial direction of tube 6 along the upper reaction area 3 bounded by electro plates 1 and 2 the transverse plate 9 and the inner surface 6A of the tube 6, until it reaches the end of the tube 6, which is closed by a rear end plate 12.” See column 3, lines 34-40 (emphasis added).

Thus, neither of the references, either alone or in combination, teach an electrolysis space that is defined by two coaxial electrodes in which the electrolysis space is an uninterrupted, generally cylindrical electrolysis space through which hydrogen gas raises the flock along a generally linear path. This is simply missing from the references cited by the Examiner.

In contrast, independent claim 1 specifically includes “feeding the mass flow from the cell to a separation tower 30 that separates a flock and purified water and allowing the hydrogen

gas to raise the flock in the separation tower 30 using coaxial pipes as electrodes, the coaxial pipes defining an uninterrupted, generally cylindrical electrolysis space through which the hydrogen gas raises the flock in the separation tower along a generally linear path...”. Because this is neither taught nor suggested by the references cited by the Examiner, Applicant submits that claim 1 is allowable for this reason alone.

Yet, claim 1 goes on to even further distinguish itself over the references cited by the Examiner. Claim 1 specifically includes “feeding flush water intermittently through the inner electrode pipe by pressure for producing flush water sprays against inner surface of the outer electrode pipe”. The references also fail to teach or suggest this. That is, neither of the references teach using coaxial pipes as electrodes to define an uninterrupted, generally cylindrical electrolysis space and introducing the flush water as claimed. While Herbst et al. does show that one electrode is inside of another electrode, Herbst et al. does not teach or suggest introducing any type of flush water for cleaning. Herbst only mentions that the polarity of the electrodes can be reversed, periodically, for cleaning. See column 9, lines 55-57, column 7, lines 46-50. Therefore, Herbst cannot teach or suggest injecting any type of flush water through an internal electrode in a set of coaxially arranged electrodes.

Similarly, Haivala does not teach or suggest this. Haivala does not even teach or suggest coaxially arranged electrodes. Instead, Haivala teaches a parallel plate system where both electrodes have holes in them for injecting agitation liquid.

Thus, even if Haivala were combined with Herbst, the combination would not teach coaxially arranged electrodes wherein the inner electrode has holes in it and wherein flush water is introduced through the inner electrode. This is simply neither taught nor suggested by the references, either alone or in combination. Thus, Applicant submits that independent claim 1 is allowed for this reason as well.

Independent claim 6 is an apparatus claim that contains a number of limitations that are similar to those found in independent claim 1. For instance, independent claim 6 specifically claims that the electrodes are formed of coaxial pipes that define an uninterrupted cylindrical electrolysis space through which hydrogen gas raises the flock in the separation tower. As

discussed above with respect to claim 1, the references simply neither teach nor suggest this. Therefore, Applicant submits that independent claim 6 is allowable for this reason alone.

Independent claim 6 also includes flushing means for feeding flush water into the system through the inner electrode. Therefore, for the same reasons as claim 1, Applicant submits that independent claim 6 is allowable for this reason as well.

Yet, claim 6 goes on to even further distinguish itself from the references cited by the Examiner. Claim 6 specifically claims that the flush water is intermittently fed “only through the inner electrode pipe...”. The references fail to teach or suggest this. The only introduction of any type of agitation medium in the references cited by the Examiner is that in Haivala. Haivala specifically shows that both electrodes in its parallel plate arrangement have holes through which the agitation medium is injected. Therefore, Haivala cannot teach or suggest injecting flushing medium only through a concentrically arranged inner electrode. Because Herbst does not even teach or suggest using any type of washing medium, it cannot remedy the deficiency of Haivala.

Further still, independent claim 6 states “the flushing medium feeding the flush water at a pressure higher than a pressure at which the pump 27 introduces the mass flow to the separation tower.” The references simply fail to teach or suggest this as well.

The Examiner relied on Herbst to teach intermittent cleaning. This is done in Herbst by simply reversing the polarity of the two electrodes. Haivala teaches continuously injecting an agitation medium into its treatment system. Even though there is no teaching in the references, the Examiner asserted that the combination of references would somehow teach intermittent introduction of a flushing medium. Applicant traverses that assertion, as it is not found in the references. Herbst teaches intermittent reversing of polarity, without introducing any type of flushing medium, and Haivala teaches the continuous introduction of an agitation medium. Those two taken together do not teach or suggest the intermittent injection of a flushing medium. Applicant thus submits that independent claim 6 is allowable for this reason as well.

Applicant has also added new claims 22-24. Independent claim 22 is drawn to a method for removing impurities from waste water by electroflotation. The method includes passing the waste water to be cleaned through an electrolytic cell and performing electrolysis between two

electrodes such that the more electronegative electrode is used for producing gas and ions from water and a less electronegative electrode is used for producing metal ions in a solution to be cleaned. The method also includes automatically controlling the cell current to obtain a controlled electric field in the cell and effecting a desired oxidation reduction reaction for removing one or more designated impurities from water to be cleaned. The method further includes “feeding the mass flow from the cell to a separation tower...that separates a flock and purified water and allowing the gas to assist in raising the flock in the separation tower...; and using coaxial pipes as the two electrodes, the coaxial pipes defining an uninterrupted, generally cylindrical electrolysis path through which the gas raises the flock in the separation tower along a generally linear path, the inner electrode pipe being the more electronegative electrode...”. Thus, independent claim 22 specifically claims that the electrolysis space is an uninterrupted, generally cylindrical path through which the gas produced in the cell assists in raising the flock along a generally linear path.

Herbst teaches a fundamentally different type of system. As discussed above with respect to claim 1, the liquid to be treated is introduced into a treatment chamber where it follows a helical path defined by separators or insulators. The helical path is substantially in a horizontal direction from the inlet 11 to an outlet that feeds to the filtering or settling tank 38. Herbst completely fails to teach or suggest two concentrically or coaxially arranged pipes, used as the electrodes, and defining an uninterrupted, generally cylindrical electrolysis space through which gas assists in raising flock in a separation tower. This is simply not found. The path through which the liquid travels in Herbst is definitively helical and not linear. In addition, gas in Herbst does not “assist in raising the flock” through an uninterrupted, cylindrical electrolysis space along a generally linear path. Instead, the electrolysis space is interrupted by insulators 15 and 19 so that it is not generally cylindrical, but is instead helical.

As discussed above with respect to claim 1, this deficiency is not cured by Haivala. In fact, Haivala does not even teach coaxial pipes used as electrodes, but instead teaches two plates 1 and 2 which are connected by a transverse plate 9. Therefore, Haivala cannot teach an uninterrupted, generally cylindrical electrolysis space. Similarly, Haivala does not teach or

suggest that gas raises a flock in a generally cylindrical space along a generally linear path. To the contrary, Haivala specifically states that the waste water is introduced through an inlet conduit 11 and it passes horizontally in the axial direction of tube 6 along the upper reaction area 3.

Therefore, neither of the references, either alone or in combination, teach an electrolysis space that is defined by two coaxial electrodes in which the electrolysis space is an uninterrupted, generally cylindrical space through which gas assists in raising the flock along a generally linear path. This is simply missing from the references cited by the Examiner. Applicant thus submits that independent claim 22 is allowable as well.

Dependent claims 23 and 24 specifically claim that the cell uses only an iron electrode as the less electronegative electrode, and only an aluminum electrode as the less electronegative electrode, respectively, Applicant submits that these claims are allowable as well.

In conclusion, Applicant submits that independent claims 1, 6 and 22 are in proper form and that they are allowable over the references cited by the Examiner. Applicant further submits that dependent claims 2-5, 7-21, and 23-24 which depend either directly or ultimately from the independent claims, are allowable as well. Reconsideration and allowance of claims 1-24 are respectfully requested.

The Director is authorized to charge any fee deficiency required by this paper or credit any overpayment to Deposit Account No. 23-1123.

Respectfully submitted,

WESTMAN, CHAMPLIN & KELLY, P.A.

By: Joseph R. Kelly/

Joseph R. Kelly, Reg. No. 34,847  
900 Second Avenue South, Suite 1400  
Minneapolis, Minnesota 55402-3244  
Phone: (612) 334-3222  
Fax: (612) 334-3312

JRK:slg